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A. C. TRUE, Director
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W. A. TAYLOR, Chief

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ILLUSTRATED LECTURE ON SWEET POTATOES: CULTURE AND STORAGE

By

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SYLLABUS 26—ILLUSTRATED LECTURE ON SWEET POTATOES: CULTURE AND STORAGE.[1]

By H. M. Conolly, *Assistant Horticulturist in Agricultural Education, States Relations Service.*

INTRODUCTION.

The sweet potato has become one of the very important food crops of the United States, and the acreage devoted to it could be greatly increased without reducing the unit value of the crop. There are thousands of farmers in the South who do not have a constant supply of good potatoes throughout the year, and very few of the small cities and towns of this territory have a continuous or suitable supply. Very few of the small cities of the West and Middle West have a supply of potatoes except during a few weeks in autumn.

With the extension of modern methods of storage which allow of potatoes being shipped to market throughout the winter and spring, and with good grading and packing, all the markets of the North, South, West, and Northwest can be supplied with good potatoes.

The sweet potato may also be raised to supply the demands of the canning factories. Canned sweet potatoes have been in great demand for a number of years, and the canners have been able to pay from 35 cents to 40 cents per bushel for potatoes at harvest time. Sweet potatoes can usually be raised at a profit when sold to the canners, as there is no expense for packing and packages, and the potatoes may be hauled direct from the field to the factory.

[1] This syllabus has been prepared by direct cooperation between the Division of Horticultural and Pomological Investigations of the Bureau of Plant Industry, as regards subject matter, and J. M. Stedman, Farmers' Institute Specialist of the States Relation Service, as regards pedagogical form. It is designed to aid farmers' institute and other extension lecturers in presenting this subject before popular audiences. The syllabus is illustrated with 51 lantern slides. The numbers in the margins of the pages refer to the lantern slides as listed in the Appendix.

Besides raising sweet potatoes for market and for the canners, they may be raised profitably for stock food. All classes of stock will eat potatoes, but they are especially valuable for hogs and cattle.

SOILS.

Sweet potatoes can be grown on nearly every type of soil, but a sand or sandy loam soil will give the best results. The subsoil should be clay, so that the plant food will not easily leach away, but the clay should be of a porous character to afford good drainage. Soils medium in fertility are to be preferred to very rich soils, for the latter will produce a heavy growth of vines at the expense of roots. Good crops may be produced on run-down cotton, corn, or tobacco lands if a leguminous crop is planted to increase the humus in the soil. Newly cleared pine land will produce excellent crops of sweet potatoes when properly fertilized.

ROTATIONS.

A systematic rotation of crops should be practiced when raising sweet potatoes, for in this way it is possible to check materially the spread of sweet-potato diseases. The continuous cropping of the land with sweet potatoes depletes the humus content in the soil, while with a proper rotation, using a soil-improving crop every three or four years, it is possible to maintain the supply of humus.

The rotations to be followed will depend entirely upon the indivdual farmer's needs, but the following is suggestive and may be changed to suit any particular case.

A good 4-year rotation for the northern part of the sweet-potato growing area would be:

First year: Sweet potatoes.
Second year: Tomatoes or other vegetable crop, with clover seeded late between the rows.
Third year: Clover.
Fourth year: Corn.

A suggestive 4-year rotation for the Southern States would be:

First year: Sweet potatoes.
Second year: Oats, followed by cowpeas or peanuts.
Third year: Cotton with bur clover or crimson clover between the rows.
Fourth year: Corn with cowpeas, peanuts, or velvet beans between the rows.

A good 3-year rotation:

First year: Early Irish potatoes or other early vegetable crop, followed by sweet potatoes.

Second year: Oats, followed by cowpeas, soy beans, or peanuts.

Third year: Corn, with cowpeas, peanuts, or velvet beans between the rows.

PROPAGATION OF PLANTS.

Sweet potatoes may be grown from either draws (slips, plants) or vine cuttings. If extra early potatoes are desired, draws should be used, but for later crops vine cuttings are generally preferred. When vine cuttings are to be used draws are set in the field as early as possible, and after the plants begin to send out runners cuttings are made to plant the additional acreage. One acre of early-set plants under average conditions will furnish enough cuttings to set 6 to 10 acres.

PLANT BEDS.

Draws are produced by sprouting medium-sized or small roots in warm plant beds. These beds are usually heated by using fresh horse manure or by means of fire carried in flues underneath the bed. Wherever steam or hot water is used on the farm it may be economical to heat the beds from this supply.

In some instances plants are grown in cold frames covered with glass, the heat from the sun being the only heat secured. Plants for a late crop are often grown in the open without any heat or protection.

The hotbeds should be located on a well-drained southern slope, in a place where they will have protection from cold winds. If a natural shelter does not exist a windbreak may be constructed of boards, pine boughs, corn fodder, etc. The beds should be located near a good water supply and as convenient to the farm buildings as possible.

COVERS OF BEDS.

Plant beds need some form of covering, not only to retain the heat, but to shed water. The ideal covering is glass sash, but where this is not available canvas or oiled muslin is used. Many growers in the South practice covering the beds with hay or pine straw, but where early plants are desired this covering is not satisfactory.

TIME OF BEDDING.

Sweet potatoes are usually bedded in plant beds about six weeks before they are desired for planting, but if no source of heat is supplied plants can not be secured under seven or eight weeks.

CARE OF PLANT BEDS.

In sprouting potatoes a layer (4 to 5 inches) of sand or loose soil is put in the bed, and the potatoes bedded firmly in this,
5 close together, but not touching. After the potatoes are placed a layer of 2 inches of sand is spread evenly over them and water applied until the soil is well dampened. When the plants begin to break through the surface another inch of sand is spread on the bed. The bed should be watered when dry, thoroughly moistening the soil, but not soaking it. When the plants appear the bed should be ventilated whenever the
6 weather permits, and a few days before planting the covers should be left off entirely to harden the plants.

MANURES AND FERTILIZERS.

Stable manure is an excellent fertilizer for sweet-potato lands, especially those which are deficient in humus. Heavy applications of fresh manure should not be applied shortly before planting sweet potatoes, for the manure will cause excessive growth of vines at the expense of the roots. It is a very good plan to use the manure on the crop that precedes the sweet potatoes, thus the manure is very thoroughly incorporated with the soil before the sweet potatoes are planted.

Commercial fertilizers will produce good crops of sweet potatoes, provided the soil contains sufficient humus. The quantity and kind of fertilizer to use will depend upon the fertility
7 of the soil. When sweet potatoes follow an early crop of Irish potatoes or other early vegetables no fertilizer is needed. And when they follow a leguminous crop very little nitrogen is needed in the commercial fertilizer. The whole question of fertilizers should be studied, for the amounts of the different elements to use and the sources of these elements will depend upon prices and the materials that are available.

A suggestive formula that would do for many conditions is as follows:

	Pounds.
Acid phosphate (16 per cent)	1,000
Cottonseed meal	500
Nitrate of soda	100
Muriate of potash	300
	2,000

This mixture contains about 8.8 per cent phosphoric acid, 2.5 per cent nitrogen, and 7.5 per cent potash.

The commercial fertilizer is usually applied in the row where the crop is to be planted and stirred with the soil by running a single-shovel cultivator in the row. A ridge is then thrown up over the fertilizer. The fertilizer should be distributed at least 10 days before planting begins, so as to avoid any burning of the roots of the plants. 8

PREPARATION OF THE SOIL.

The soil for sweet potatoes should be thoroughly prepared before planting, for this extra labor in preparation will be repaid by the ease of later operations. The depth of plowing has considerable influence on the shape of the potatoes produced. A deep soil produces roots that are long and slender, while a more shallow soil tends to produce short, chunky roots which are more desirable for market. A soil of medium depth (5 to 6 inches) is usually best for potatoes. Plowing should be done when the soil will break up fine and mellow, and the harrow should follow immediately after the plowing. If the soil is very cloddy it should be rolled, and the best results are obtained after a light shower when the clods are moist. 9

Sweet potatoes are usually grown on ridges made by throwing two or four furrows together. A planker or float is then run over the ridges to flatten them down and compact the soil. Low, flat ridges are generally preferred to high ridges. There are machines on the market that will mark the land, distribute the fertilizer, and form the ridges all at one operation. 10

PLANTING.

When the sweet-potato plants have developed three or four leaves they are ready for setting in the field. The bed should be thoroughly watered before pulling the plants, and the potato should be held in place with one hand while the plants are pulled with the other. 11

The plants may be set by hand or with transplanting machines. In planting by hand a small hole is made with the finger or a pointed stick, the plant inserted in the hole, and the soil firmly packed around the plant. When the soil is dry a small quantity of water is poured around the roots, and after the water has soaked in dry soil is drawn up around the plant. Transplanting machines open the furrows, apply the water, and firm the soil about the plants all at one operation. A notched stick is sometimes used in planting. The plants are 12 13

dropped where they are to be set, the stick is placed on the plant at the base of the root, and the plant forced into the ground to the depth desired. The soil is then firmed with the foot.

The distance for setting plants depends on the variety grown. The usual distance is 14 to 18 inches apart in rows 3½ to 4 feet apart. Large-growing varieties should be planted in rows 4 to 6 feet apart. The number of plants required for planting an acre varies from 7,000 to 12,000.

CULTIVATION.

Sweet potatoes should be cultivated soon after the plants are set, to loosen the soil that was compacted during planting. Cultivations should be given after each rain, to break the crust and keep a surface mulch. The latter cultivations should also work the soil toward the row to maintain the ridge. Hand hoeings are necessary to loosen the soil between the plants and to keep down weeds. When the vines begin to interfere with cultivation they may be turned into alternate rows by means of a stick, and after the soil has been cultivated the vines are turned back and allowed to grow undisturbed. Large weeds that appear after the last cultivation may be pulled by hand.

HARVESTING.

Early sweet potatoes may be harvested as soon as the roots are large enough for market. Late sweet potatoes should be harvested just before frost is expected or as soon as possible after frost has killed the vines. When frost has killed the vines and it is not possible to dig the potatoes at once, the vines should be cut from the plants to prevent decay from entering the roots.

DIGGING.

A spading fork may be used for digging small patches of potatoes, but for larger areas a plow or regular potato digger should be used. Potatoes should be harvested with as little bruising as possible, for bruised potatoes do not keep well. The implement used for digging should be one that will not cut or bruise the potatoes. An ordinary plow, fitted with a rolling colter to cut the vines, may be used for digging potatoes, but a much more satisfactory implement is a digger made for this particular purpose. A good type of digger is one that is equipped with iron rods in place of a mold-

board to separate the potatoes from the earth and vines. The digger should also be fitted with rolling colters to cut the vines.

After plowing out, the potatoes may be scratched out by hand and left exposed long enough for the dirt to dry. They should not be left exposed to the hot sun for any long period 18
of time or left in the field overnight. Digging should be done when the soil is dry and the weather clear.

GATHERING.

Sweet potatoes should be gathered in padded harvesting 19
baskets or crates, and every care should be used to avoid bruising them. Never handle potatoes in sacks, for the shifting causes severe bruising. A good spring wagon should be pro- 20
vided for hauling the potatoes to the storage house or to market to avoid excessive bruising. It is also a good plan to gather only the marketable roots at first, then later to go over the rows and pick up the culls. The strings, or very small potatoes, may be left in the field for hog feed. The various lots of potatoes should be stored separately, for this will save much time and loss when removing them for market.

SEED SELECTION.

Potatoes for seed should be selected in the field at harvest 21
time, for it is then possible to select only such hills as possess the required characters. When seed is selected from the stored potatoes there is no way of knowing whether they came from 22
poor-yielding or good-yielding hills or whether the plants that produced them were diseased or not. When the whole plant is considered in selecting the seed potatoes it is possible to select hills that produce a large number of uniform marketable roots of the required shape and color and also to select hills that show no traces of sweet-potato diseases. By selecting every year only such hills as possess the characters which are desired, it is possible in a few years to have the bulk of the crop possess these characters.

STORAGE.

Storage in regular storage houses is the only practicable method of keeping sweet potatoes on a commercial scale. A few crates of potatoes required for home use may be stored in the attic over the house kitchen.

Storage in banks and outdoor cellars has been the custom 23
throughout the South for a great many years, but this type of

storage is being rapidly replaced by house storage. Very few of the potatoes stored in banks or cellars are suitable for market, for those that do not decay make such a poor appearance and are of such poor quality that they are not desirable. The banks are not economical for storage because too much labor and expense are necessary every year to make them, the temperature and moisture in them can not be controlled, potatoes can not be taken from the banks when the weather is cold or the earth is wet, and potatoes from banks will decay very quickly upon removal.

To keep sweet potatoes successfully they should be thoroughly dried or cured when stored and kept at a uniform temperature and in a relatively dry atmosphere. Only in a properly built storage house is it possible to secure these conditions.

A sweet-potato storage house may be constructed of stone, brick, cement, hollow tile, logs, or lumber, but to secure the best results lumber should be used. The walls of cement, stone, etc., are always cold, and it is difficult to prevent them from becoming wet. It is also hard to prevent the collection of moisture in dugouts and cellars.

The size of house to build will depend upon the quantity of potatoes to be stored and also on the method of storing, whether in bins or crates. Crates usually occupy more space than bins. The following figures give the relative capacity of various sizes of storage houses:

Relative capacity of various sizes of storage houses.

Size of house.	Approximate capacity.	
	Crates.	Bushels in bins.
12 by 16 feet	300	500
20 by 20 feet	800	1,000
20 by 40 feet	1,900	2,200
24 by 60 feet	3,600	4,000
24 by 90 feet	5,500	6,000
24 by 90 feet (2 floors)	10,000	11,000

The crates as figured are standard slatted crates, and the bushels in bins are 55 pounds at harvesting time. A rough method of estimating storage space is to figure each cubic foot of bin space as holding five-eighths of a bushel of potatoes and each crate as occupying a space 20 inches long, 14 inches wide, and 1 foot high, or 2 cubic feet.

The cost of building a storage house will depend upon the kind of lumber used and its price and also upon the labor available. A 20 by 40 foot house will cost anywhere from $150 to $350. Many houses have been constructed of second-grade lumber, farm labor being used to do the work, and the cost has been very low. In many instances it has been possible to remodel an old tenant house, granary, or shed at little expense to make a very serviceable storage house.

HOUSE CONSTRUCTION.

The supports (pillars) for a house may be made of brick, cement, or blocks of wood, and should be at least 18 inches high and 12 inches in diameter. There should be three rows of these supports for a house over 15 feet wide, one row under each side of the house and one row under the middle. On these supports are placed the sills (8 by 8 inches) and across the sills are placed the sleepers (2 by 10 inches).

The walls of the house are constructed by setting 2 by 4 or 2 by 6 studding on the sills every 2 feet, and at the top of these are spiked the plates (4 by 4 inches). On the outside of the studding is nailed a layer of rough boards, laid diagonally to help brace the wall, and over these boards a layer of building paper, then the drop siding. On the inside of the studding are laid rough boards, then a layer of building paper, and over this a layer of matched lumber. The wall constructed in this manner consists of two air-tight walls inclosing a dead-air space. This type of wall is more satisfactory than a wall filled with sawdust or shavings, for these materials soon collect moisture and the walls decay.

The roof of the building is constructed in the same manner as any house roof, with rafters, rough boards over the rafters, then building paper, and last the roofing. This roofing may be sheet iron, roofing paper, or shingles.

The floor of the house is constructed by laying rough boards across the sleepers, then a layer of building paper is laid over the rough boards, and matched flooring is laid on the building paper. The matched flooring is usually laid crosswise of the house.

The ceiling is sometimes made by running 2 by 4 girders across on top of the eave plates and on the underside of these building paper and matched ceiling lumber are nailed. A much better ceiling may be made by nailing building paper and matched ceiling lumber on the underside of the rafters to about two-thirds of the way to the ridge of the house and then across on 2 by 4's, as mentioned above.

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34 The windows for a storage house should be located about 2 feet from the floor, and they should open outward. Some of the windows should be of glass, so as to allow the entrance of light when needed without opening the house. All window openings, even those containing glass sash, should be fitted with well-battened shutters to protect the potatoes from cold and moisture.

It is essential that a house be thoroughly ventilated when necessary, and for this purpose ventilators are constructed in
35 the roof and openings made in the floor. The outlets through the roof may be constructed by nailing two 8-inch and two 10-inch boards together to form an 8-inch box. This box should extend from the inside ceiling of the house to about 18 inches, or 2 feet above the roof. The top of the ventilator should be provided with a hood to keep out rain and the bottom with a cover so that the ventilator may be closed in cold weather. Every house over 20 feet in length should be provided with at least two ventilators. The openings through the floor should be 10 or 12 inches square and provided with a tight-fitting cover, so that they may be closed when necessary.

36 The bins for holding the potatoes should be constructed to allow as much circulation of air as possible. They should be set at least 6 inches away from the wall, and a space of 4 inches should be left between the bins and under the floor of the bins. The sides of the bins are formed by setting 2 by 4's upright and nailing across these 3 or 4 inch boards laid with an inch space between. The 2 by 4's between the bins are slatted on both sides so as to provide a 4-inch air space between bins. The floors of the bins are formed by laying two 2-by-4 scantlings edgewise running lengthwise of the bins and nailing boards across these in the same manner as for the sides of the bins. The floor of the bin may be made in one or two sections, and if cut 2 inches narrower than the width of the bin and not fastened down it can be readily removed when it is desired to clean out the bins. The size and shape of the bins depends on the size of the house, but to get good air circulation the bins should not be over 4 feet in width.

The heating apparatus for a storage house usually consists of a cheap sheet-iron stove. Vitrified tile may be run through the roof of the house and the stovepipe run through the tile, thus lessening the danger from fire. Kerosene oil heaters are
37 also being used with satisfactory results. In the more northern sweet-potato regions, where heat is required throughout the storage period, hard-coal stoves and hot-water heating systems

are in common use, and the storage houses are usually provided with basements.

STORING POTATOES.

Potatoes may be stored in bins, in shelves, or in crates and hampers. Storage in crates or hampers wherever practicable is to be advised, for in this way the handling of the potatoes from the field to the house is reduced to a minimum and the potatoes will cure much quicker. When it is desired to market the potatoes, the hampers or crates are emptied and the potatoes repacked in the same packages. Where potatoes are sold in a local market and packages are not needed, this method of storage may be more expensive at the start than storage in bins. If potatoes are stored in bins they should be carefully rolled from the crates into the bins so as to avoid bruising. In filling the bins it is a good plan to distribute each load of potatoes among several bins, for in this way the potatoes dry much better. When crates or hampers are used for storing potatoes the layer next the floor should be placed on 2 by 4's so as to allow a circulation of air along the floor.

MANAGEMENT OF THE HOUSE.

After a house is a year old it should be thoroughly cleaned and disinfected each year before being used. All dirt and decayed potatoes should be taken out, and the interior of the house, together with all harvesting baskets, crates, bin materials, etc., should be sprayed with a solution of copper sulphate, made by dissolving 1 pound in 25 gallons of water, or a solution made by dissolving 1 pint of formalin in 30 gallons of water. Repeat this spraying after about 24 hours.

A day or so before the storage house is to be used a fire should be started to dry it out thoroughly, and if the house is new the fire should be started several days in advance of storage in order to drive the moisture out of the lumber used in the building. During the period when the potatoes are being stored and for 10 days or 2 weeks afterwards a temperature around 85° F., with plenty of ventilation, should be maintained. Even if it is not possible to secure 80° F. or above, the ventilators should still be left open, so as to allow the moist air to escape. During the curing period the windows and doors may be closed at night and on rainy days, but at other times they should be left open.

When the potatoes are thoroughly dried or cured the temperature should be gradually reduced to 55° F., at which point it should be kept during the entire storage period. During the

winter, if the temperature in the house should drop below 48° F., a fire should be started or the house opened when the air outside is warm and dry. If the temperature should go above 60° F., the house can be opened when the air outside is cool. Should drops of moisture appear on the walls or ceiling the fire should be started and the ventilators opened to allow the moisture to escape. The essentials in the proper management of a storage house are to keep it dry and to maintain a uniform temperature around 50° to 55° F.

Success in storing sweet potatoes does not depend entirely upon successful storage methods. There are a number of sweet-potato diseases, notably black rot, stem rot, and foot rot, which may cause serious damage in the storage house. The elimination of disease should be closely coupled with good storage methods to give best results.

DISEASES.

The sweet potato is attacked by a number of fungus diseases, some of which attack the vine and others the tubers. Some of these diseases develop and cause losses in the field, while others appear after the potatoes are placed in storage. With a knowledge of the different diseases and how they spread, with a proper system of crop rotation, and with care in the selection, handling, and bedding of seed potatoes, much of the loss from diseases can be avoided.

STEM ROT (WILT, BLUE STEM, YELLOW BLIGHT).

This disease is caused by the fungi *Fusarium batatatis* and *Fusarium hyperoxysporum*. The stem rot is first noticed as a yellowish discoloration of the leaves at the tips of the vines. If the stem is pinched open it will be found blackened inside.
38 This discoloration often extends 3 to 5 feet from the hill, and is soon followed by wilting and collapse of the vine. Later the stem ruptures and the surface becomes blackened and rotted, though the plant may produce a few potatoes. The fungus causing the disease may invade the potatoes also, forming a blackened ring about a quarter of an inch below the surface.

Control.—The fungus causing stem rot lives through the winter on dead sweet-potato vines left in the field and in potatoes put in storage. The disease may be spread by insects, farm animals, farm implements, and wind, or by dumping discarded diseased potatoes on the fields as fertilizer either before or after feeding to live stock.

Stem rot may be controlled by proper selection and handling of seed potatoes, by using clean hotbeds, and by crop rotation. The fungus causing stem rot invades the potatoes; therefore, if plants are produced from these potatoes, they will become diseased. It is very hard to detect the disease on young plants when pulled from the bed, therefore many diseased plants are set in the field and continue the spread of stem rot. It is necessary, then, to have seed potatoes free from disease, and these can be secured by growing seed from vine cuttings on new land or in selecting the seed in the field at time of digging. In selecting the seed each hill should be tested by splitting the stem, and if no black streaks appear the potatoes may be used for seed. This selection should be done before frost has blackened the vines. The seed potatoes should be placed in the storage house separate from other potatoes.

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Dipping seed.—In the spring at bedding time the seed potatoes should be dipped for 5 to 10 minutes in a solution of corrosive sublimate, made by dissolving 1 ounce in 8 gallons of water. The solution should be placed in a wooden container, such as a keg or barrel, and the potatoes may be dipped by using a burlap sack or a wire basket. After dipping the potatoes should be rinsed in clean water and allowed to dry before being bedded. This dipping will not kill the fungi that may be in the potatoes, but it will destroy all spores on the surface.

Preparation of the hotbed.—The use of the same hotbed year after year is probably one of the chief ways of spreading stem rot. In localities where the disease is prevalent the soil in the hotbed should be changed every year, and the framework of the bed and surrounding ground should be thoroughly soaked with a solution of 1 pint of formalin to 30 gallons of water or a solution of 1 pound of copper sulphate to 25 gallons of water.

New soil or sand for the hotbed should be procured from a field where potatoes have never been grown. As rich dirt is not necessary for the bed, sand may be procured from a sand bank and thus danger of infection considerably lessened. The same wagon or tools used in hauling away infected dirt should not be used for hauling in new sand, unless they have been disinfected with a solution of formalin or copper sulphate of the strength previously mentioned.

In localities where sweet-potato diseases are prevalent fire-heated hotbeds are preferable to those heated by manure on account of the chances that the manure may have become infected. Discarded diseased potatoes usually find their way to

the manure pile, and if any diseased potatoes are left anywhere about the farm, infected parts may be carried around on the feet of chickens and other farm animals.

Crop rotation.—Healthy plants may be grown by careful seed selection and proper care in the preparation of the hotbed, but if these plants are set in soil that is infected with disease, much of the effort toward control is wasted. Sweet potatoes should be set in new ground or ground upon which potatoes have not been grown for several years. It is not known how long the fungus of stem rot will live in the soil in the absence of sweet potatoes, but if they are not planted oftener than once in four years the fungus will undoubtedly be greatly reduced.

BLACK ROT (BLACK SHANK, BLACK ROOT).

Black rot is caused by the fungus *Sphaeronema fimbriatum* and may occur on any underground part of the plant. On the potatoes the disease is characterized by dark, slightly sunken, more or less circular spots, while on the stems it appears as
40 small black spots which soon enlarge until the whole stem is rotted off. On the potatoes the surface of the diseased spots is of a metallic luster and just underneath the spots the tissue is green. When cooked the potatoes are very bitter.

Control.—Black rot is disseminated in about the same general way as stem rot, but unlike stem rot it spreads freely in the storage house if conditions are favorable. The fungus may be spread in the storage house by handling the potatoes, by settling in the bins, and by flies and other insects which may carry the spores on their bodies. The same methods of control used for stem rot will control black rot, emphasis being laid on preparation of the hotbed, proper selection and handling of seed, and crop rotation. Where black rot is prevalent the potatoes after being dipped should be picked over carefully, and all that show suspicious-looking black spots should be discarded. Treating the fields with lime, sulphur, etc., has no effect on the disease, and dipping the plants in Bordeaux mixture of lime-sulphur mixture is not to be recommended.

FOOT ROT (DIE-OFF).

This disease is caused by a fungus called *Plenodomus destruens.* The disease first appears as small brown-to-black
41 spots on the stem of the plant near the soil line. These spots spread very slowly, but eventually girdle the plant and extend 4 or 5 inches up the stem, followed later by wilting of the plant.

Control.—Foot rot is distributed in the same manner as stem rot and black rot, but unlike black rot it does not cause heavy damage in the storage house. Proper seed selection, care in preparing the hotbed, and crop rotation will aid in controlling foot rot the same as stem rot and black rot.

SCURF (SOIL STAIN, RUST, JERSEY MARK).

This is a disease caused by the fungus *Monilochaetes infuscans* and is characterized by a brown discoloration of the surface of the underground parts of the plant. The discolored 42
areas may be spots of varying size and shape, or there may be a uniform discoloration of the entire surface of the potato. Scurf does not produce any rupture of the skin of the potato, and the diseased areas are so superficial that they may be easily scraped off with the finger nail.

Control.—The fungus lives through the winter on potatoes in storage and on decayed vines left in the field. If infected potatoes are used for seed, the fungus grows from them onto the plants and is carried to the field. No injury is caused to the plants in the bed or in the field, but the growth follows down from the stem of the plant to the potatoes. Dipping the seed as for stem rot will destroy all spores that may be on the surface of the potatoes. Deep, clean cultivation, crop rotation, and the selection of disease-free seed potatoes will aid in controlling scurf. Potatoes upon which scurf appears are just as good for food as those with no scurf, but their market value is much lower. Scurfy potatoes in a storage house which is kept very dry will soon become shriveled and dried.

SOFT ROT.

Soft rot is caused by a mold known as *Rhizopus nigricans*, and this fungus is one of the most destructive diseases in the storage house. The fungus enters at one end of the potato and grows rapidly. With a high temperature and a relative high humidity a few days are sufficient to destroy the entire potato. The potatoes become soft, watery, and stringy at first, but as the moisture in the roots evaporates they become hard and brittle. When the skin is ruptured while the potato is soft a moldy growth appears on the surface. The spores of the 43
fungus may be spread by handling the potatoes, or they may be carried about the storage house by flies and insects.

Control.—Careful handling of the potatoes when stored, so as to avoid bruises, and proper management of the storage house, as recommended under "Storage," will aid in controlling soft rot.

RING ROT.

This disease is caused by the same fungus that causes soft rot, but it differs from the other in that the fungus enters at a point between the ends of the potato. From the point of entrance the decay spreads until a ring is formed around the
44 potato. In the presence of sufficient moisture and high temperatures the fungus may destroy the potato, but under favorable conditions the fungus may only make the ring, and then the decay will become hard and dry.

Control.—The same precautionary measures taken for soft rot will control ring rot.

JAVA BLACK ROT.

Java black rot is caused by the fungus *Diplodia tubericola*
45 and is a storage rot. The fungus usually enters at the end of the potato and grows very slowly, taking from four to eight weeks to destroy a potato completely. It causes a shrinkage of the potato, rendering it coal black within and very brittle.

Control.—This fungus is widespread and prevalent throughout the Southern States and is likely to prove one of the serious storage-house troubles. It develops under relatively dry conditions. Little is known at present about methods for its control.

DRY ROT.

This disease is caused by the fungus *Diaporthe batatatis.* The fungus begins at the end of the potato and produces a firm
46 brown rot. It grows slowly, and the potato becomes hard and mummified. This fungus is widespread, but is not considered a serious storage trouble.

VARIETIES.

The variety of sweet potato to grow depends on the purpose
47 for which it is to be used. If potatoes are grown for stock food, the heaviest yielding varieties, such as Southern Queen, Yellow Strasburg, Triumph, Red Bermuda, and Big Stem Jersey, should be planted. For home use the varieties to grow are the ones that are preferred by the members of the family. When growing for market the best variety is the one that is preferred in the markets where the potatoes are to be sold. Some of the best table varieties for southern markets are
48 Nancy Hall, Dooley, Porto Rico, Pumpkin Yam, Yellow Yam, Bunch Yam, and Southern Queen. For northern markets the demand is for dry-fleshed varieties, such as Yellow Jersey, Big Stem Jersey, Red Jersey, and Triumph. The Triumph is one of the earliest varieties and is recommended for sections in the

South where early sweet potatoes are grown for northern markets. Where early sweet potatoes are grown in the South for local markets the Nancy Hall is to be recommended. 49

MARKETING.

When sweet potatoes are to be marketed at harvest time they are usually graded and packed in the field. The Jersey type of sweet potato is usually sold in three grades—fancy, primes, and seconds. The fancy grade includes the selected potatoes both in size and shape; the primes include all potatoes of good size suitable for first-class trade; the seconds include the smaller and more irregularly shaped potatoes. The cull potatoes are used for stock food or are sold to the canning factories. Grading according to some fixed standard is not generally practiced in the South, but such grading is very much needed. Until the time when fixed standards for grading the various southern varieties of sweet potatoes can be worked out, the southern shippers might separate their marketable potatoes into the following grades: Fancy, to include all potatoes of a medium size free from bruises and of good shape, typical of the variety (good baking size); primes, to include all potatoes which are a little above medium size and not typical in shape (used for frying and boiling); seconds, to include potatoes a little under medium size and irregular in shape. All potatoes that are bruised, cracked, very irregular in shape, or overgrown should be kept at home for stock food or sold to the canners if the canners will take them. 50

Where sweet potatoes are marketed during the winter they may be taken from the bins or packages in which they are stored, rolled out carefully onto canvas-covered tables, and sorted into the grades mentioned above. As the potatoes are graded they should be placed in suitable packages for shipment.

PACKAGES.

Sweet potatoes are shipped in a number of different styles of packages, among the most widely used being the hamper, the veneer and tight barrel, and the bushel crate. In a great many sections the veneer barrel is used in shipping the potatoes when sold at harvesting time, but the tight barrel is used for winter shipments. Hampers and bushel crates are being used more generally every year instead of bins for the storage of potatoes, and when the time comes for marketing the potatoes

are taken from the hampers or crates, graded, and repacked in the same packages.

PACKING.

In packing sweet potatoes every potato should be handled separately and placed in position in the package. By placing each potato in the package a tight pack is secured, in which the potatoes do not shift around and become bruised and which shows a full package when opened on the market. The top layer of potatoes in the package is usually placed with the side up and a brush run lightly over the surface to remove the dust and dirt.

When potatoes are shipped during the winter the packages are lined with paper to avoid freezing. When carload shipments are made in the winter, refrigerator cars or cars provided with stoves should be used whenever possible.

COST OF PRODUCTION.

The cost of growing sweet potatoes will vary in different sections of the country, depending on the extent to which the crop is grown and the cropping plan that is followed. An estimated cost of producing an acre of potatoes would be within the following limits:

Cost per acre of producing sweet potatoes

Preparation of the land	$2.00 to $8.00
Plants (10,000 to 12,000)	10.00 to 18.00
Planting	3.50 to 6.00
Fertilizer	7.50 to 17.50
Cultivation	3.00 to 5.00
Harvesting	10.00 to 15.00
Land rental	3.00 to 6.00
Total cost per acre	$39.00 to $75.50

Average yields of the better growers of sweet potatoes are 125 to 300 bushels per acre. The average prices received by the growers are 30 to 60 cents per bushel at harvesting time and 75 to 90 cents per bushel during the winter.

FEED FOR LIVE STOCK.

Sweet potatoes are a much more valuable feed for live stock than most farmers realize. Three or four bushels of sweet potatoes are equal to a bushel of corn as a feed for hogs, and when fed in connection with peanuts, cottonseed meal, or

other concentrate, they provide a good ration for both hogs and cattle. Sweet potatoes may be stored and fed during the winter to all classes of farm animals that need succulent food. On the lighter soils, which only produce from 20 to 25 bushels of corn per acre, 100 to 150 bushels of sweet potatoes can be grown with the same care and attention. Some farmers who grow sweet potatoes for market estimate that the vines and culls left after harvesting are worth from $5 to $6 an acre for hog-feeding purposes. 51

APPENDIX.

LANTERN SLIDES.

No. of view.

1. Corn land making less than 8 bushels of corn per acre.

   This same land with the same expense and care will produce at least 100 bushels of sweet potatoes for feed.

2. How very poor corn land can be improved for sweet potatoes by planting cowpeas between the rows of corn.
3. Two suggestive 4-year rotations for use in sweet-potato growing.
4. Construction of a fire-heated sweet potato plant bed.
5. Bedding sweet potatoes.
6. Sweet-potato plants large enough for setting.
7. A suggestive fertilizer formula for sweet potatoes.
8. Distributing fertilizer in the row for sweet potatoes.
9. Harrowing the land with a cutaway harrow fines the soil and saves much of the later labor with the crop.
10. Ridging up land for sweet potatoes.

    Note how fine and mellow the soil appears.

11. Ideal sweet-potato plants.
12. Setting sweet-potato plants by hand.
13. Setting sweet-potato plants by machine.

    With this machine the plants are set and watered at one operation.

14. Some hand tools sometimes used in setting plants.
15. A tool sometimes used to throw the soil toward the ridge.
16. Turning sweet-potato vines.
17. A good type of sweet-potato plow.

    Fitted with two rolling colters for cutting the vines.

18. Sweet potatoes laid out to dry off before being gathered up.

    Note how vines are left between rows where they can be easily covered in plowing.

19. A good type of basket for use in gathering sweet potatoes.
20. A good method of hauling sweet potatoes to the storage house or to market.
21. Selecting seed potatoes in the field.

    The whole plant is carefully considered.

22. Other factors being considered, this is the type of hill to select for seed.

    No overly large potatoes and no strings.

23. Two types of storage that have been commonly used in the South—the bank and the outdoor cellar.
24. Two methods used in storing potatoes in banks.

    The long bank with pine straw and earth as a covering and the round bank with cane leaves and earth used for a covering. Both consume a great deal of labor in their proper construction.

25. A long bank with tar paper and boards used to shed water from the potatoes.

    Quite expensive.

26. Banks covered with a roof made of rough boards.

    Costly and short lived.

27. A serviceable storage house which was constructed at little expense. Second-grade lumber and farm labor were here utilized.

28. An old barn which was remodeled at little expense so that potatoes were stored in the lower part and the loft used for storing hay.

    Upper and lower doors have been built in the far end of the house.

29. A small tenant house remodeled and used as a storage house.

30. A very common type of tenant house found all over the South.

    Many of these houses can be remodeled at very little expense to form satisfactory storage houses.

31. Drawing showing how the walls of a storage house are constructed to form two tight walls inclosing a dead-air space.

32. A very good roof made by using roofing paper.

33. Drawing showing a good method for the construction of the ceiling in the storage house.

34. A good type of window which answers both as a window and a shutter.

35. Drawings showing the construction of a box ventilator.

36. Well-constructed bins.

    Note the air spaces under the removable floor, between the bins, and at the front of the bins.

37. A type of storage house used to a great extent in the more northern sweet-potato regions.

    Note the basement where the heating plant is located and where potatoes are stored for a short time and marketed in the fall. The ventilation is secured through the attic and the windows in the gable ends of the house. Ventilators through the roof would be more efficient.

38. The characteristic appearance of stem rot on leaves, stems, and roots of sweet potatoes.

39. Splitting the stem on a hill of sweet potatoes to see if stem rot is present.

40. Appearance of sweet-potato plants and roots when affected with black rot.

41. Foot-rot disease on the stem and root of a sweet-potato plant.

42. The discoloration on a sweet potato produced by the fungus causing scurf.

43. Moldy growth of the fungus causing soft rot.

44. Characteristic appearance of potatoes affected with ring rot.

45. A potato showing the dry, mummied condition produced by the fungus causing the Java black rot.

46. A potato showing the dried appearance produced by the fungus causing dry rot.

47. Varieties of sweet potatoes which are among the best to grow for stock seed.

48. Varieties which may be grown for the southern markets.

49. Varieties which may be grown for the northern markets.

50. Sweet potatoes graded, and packed in hampers in the field.

    Note the uniformity of the potatoes. The potatoes in the hamper in the rear are seconds, the others are primes.

51. A very heavy yield of potatoes.

    Note the great number of overgrown potatoes and the heavy growth of vines which could be very profitably utilized for stock-feeding purposes.

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